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W.F.

LOCKHEED AIRCRAFT CORPORATION
MISSILE SYSTEMS DIVISION

REPORT MSD-1238

ENGINEERING TEST DEPARTMENT 74-24

DATE June 7, 1955

Environmental Test Group No. (21)

74-24 REF: SN 180

SUBMITTED UNDER AF 11 (650) 228600

MODEL X-7A

REQUESTED BY S. Foote

DEPT. 74-23

CHARGE 3-4280-1077

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GROUP APPROVAL

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TITLE:

VIBRATOR (CORNELL-DUBILIER 5622-S)
ENVIRONMENTAL PERFORMANCE EVALUATION

OBJECT

To examine the effect of temperature variation, acceleration, vibration, and shock upon the performance of the specimen vibrator.

SPECIMEN

Two Cornell-Dubilier 5622-S Vibrators.

APPARATUS

1. Benco Portable Temperature Chamber
2. Gemisco Centrifuge
3. Calidown Model 44 Shaker
4. Glenrite Ballistic Pendulum
5. Appropriate power Supply and Monitoring Oscilloscope

PROCEDURE

The vibrator was wired as per Figure 1, page 4. The following test conditions were imposed on the specimen vibrator:

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1. Temperature: -20°C , 0°C , $+20^{\circ}\text{C}$, $+40^{\circ}\text{C}$, $+60^{\circ}\text{C}$, $+75^{\circ}\text{C}$
2. Acceleration: Six directions, (see Figure 2, Page 4) up to the centrifuge maximum of about 105°G , then down to standstill.
3. Vibration: Three planes, 20 to 2000 cps, at 10°G .
4. Shock: Three 100°G impacts in each of six directions.

The vibrator output was monitored with an oscilloscope.

RESULTS

1. No significant change was observed in the output square wave of Vibrator No. 1 throughout the temperature test.
2. Vibrator No. 1 gave the following results under acceleration:

Table I

Acceleration Test Data

DIRECTION	DISTORTION OF OUTPUT SQUARE WAVE BEGINS AT:	COMPLETE LOSS OF OUTPUT AT:	NORMAL OUTPUT RESUMES AT: (DECELERATING)
1	25 G	NONE	14 G
2	73 G	NONE	40 G
3	NONE	NONE	—
4	49 G	68 G	11 G
5	16 G	55 G	5 G
6	21 G	53 G	8 G

3. Vibrator No. 1 became inoperative shortly after vibration tests began in plane 3-4 (Ref. Figure 2). Specimen No. 2 was installed: The vibration testing appeared to have small effect on its output square wave, except for a slight pulsation of the entire wave form at about 40 cps in planes 3-4 and 5-6.
4. Under shock testing, Vibrator No. 2 output remained relatively unaffected.

CONCLUSIONS

Unit No. 1 was cut open for inspection, revealing that the moving contacts had fouled against a portion of the vibrator's structure during vibration and became jammed there. No physical damage had occurred.

Barring the possibility of such jamming of its mechanical components, the vibrator appears to give fairly constant square wave output under the above environments, except under acceleration in certain directions. A possible deterrent to acceptance of this unit for certain applications may be the inadequacy of the actual wave form generated.

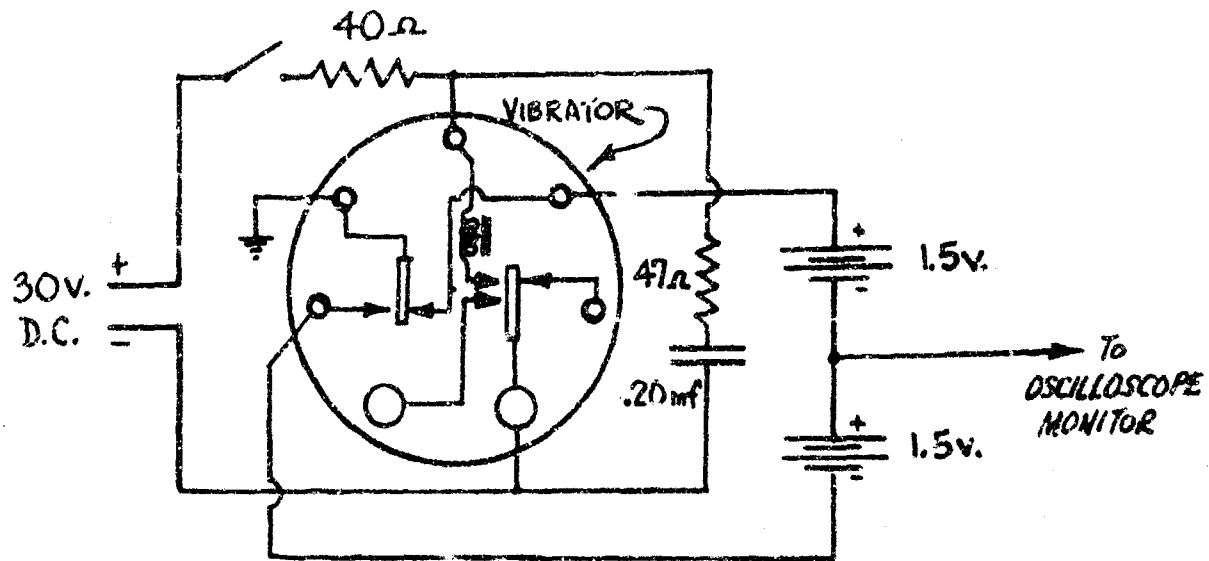
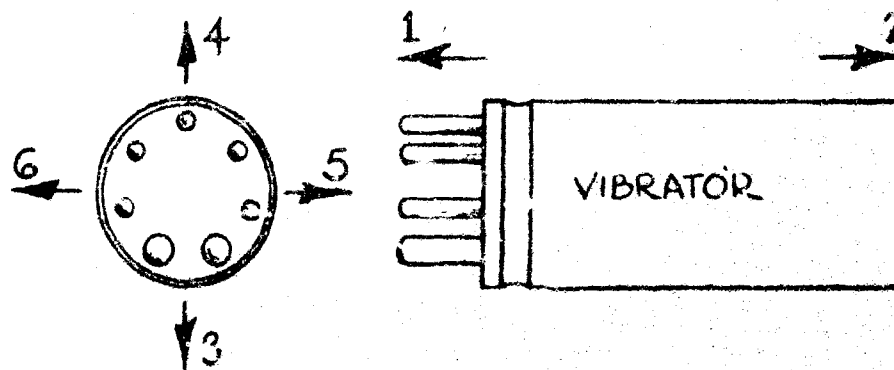


FIG. 1. WIRING DIAGRAM



ARROWS INDICATE DIRECTION OF ACCELERATION;
REACTION FORCE IS OPPOSITE.

FIG. 2. TEST ORIENTATION